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IS 9299-3-6 (1993): Insulating Materials Based on Built-up Mica or Treated Mica Paper, Part 3: Specifications for Individual Materials, Section 6: Glass Backed Mica Paper With B-Stage Epoxy Resin Bond [ETD 2: Solid Electrical Insulating Materials and Insulation Systems]

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Indian Standard

INSULATING MATERIALS BASED ON BUILT-UP MICA OR TREATED MICA PAPER — SPECIFICATION

PART 3 SPECIFICATIONS FOR INDIVIDUAL MATERIALS

Section 6 Glass Backed Mica Paper With B-Stage Epoxy Resin Bond

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BUREAU OF INDIAN STANDARDS
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NEW DELHI 110002

January 1993 **Price Group 2**

Solid Electrical Insulating Materials Sectional Committee, ETD 02

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Solid Electrical Insulating Materials Sectional Committee had been approved by the Electrotechnical Division Council.

This standard is one of a series which deals with built-up mica or treated mica paper. This series will have the following three parts:

Part 1 Definitions and general requirements
Part 2 Methods of tests
Part 3 Specifications for individual materials

This standard (Part 3/Sec 6) deals with specification for glass backed mica paper with B-stage epoxy resin bond.

In the formulation of this standard, assistance has been derived from IEC Doc : 15 (Secretariat) 247 draft specification for insulating materials based on mica : Part 3 Specifications for individual materials, Sheet 2 Glass backed mica paper with a B-stage epoxy resin bond, issued by the International Electrotechnical Commission (IEC).

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

INSULATING MATERIALS BASED ON BUILT-UP MICA OR TREATED MICA PAPER — SPECIFICATION

PART 3 SPECIFICATIONS FOR INDIVIDUAL MATERIALS

Section 6 Glass Backed Mica Paper With B-Stage Epoxy Resin Bond

1 SCOPE

This standard (Part 3/Sec 6) covers the requirements for electrical insulating materials made by combining mica paper and glass fabric and impregnating them with an epoxy resin. The material is supplied in a flexible state with the resin in the B-stage for final cure after application.

The standard covers materials having nominal thicknesses from 0·09 mm to 0·4 mm.

2 REFERENCES

The following Indian Standards are necessary adjuncts to this standard:

IS No.	*Title*
9299 (Part 2) : 1992	Insulating materials based on built-up mica or treated mica paper: Part 2 Methods of test (*first revision*)
9299 (Part 3/Sec 7) : 1992	Insulating materials based on built-up mica or treated mica paper: Part 3 Specifications for individual materials, Section 7 Mica paper

3 GENERAL REQUIREMENTS

All material in any one consignment shall have the same properties, within the limits of this standard, throughout the length of each roll.

The surfaces shall be uniform and free from defects, such as bubbles, pinholes creases and flaws.

The roll shall be capable of being unrolled without damage and the force required to unroll the material shall be substantially uniform. Where interleaving is necessary or required by the purchaser it shall not have any deleterious effect.

Unless otherwise specified the material shall be rolled with the mica surface on the outside.

4 COMPOSITION

4.1 Mica Paper

Mica papers covered by this standard having substances of 60 g/m² to 370 g/m² shall comply with the requirements of IS 9299 (Part 3/Sec 7) : 1992.

4.2 Glass Fabric

The glass yarns shall be continuous filament glass fibre made from E glass. The glass fabric shall be in the loom state and have binder content not greater than 3 percent by mass and/or suitable finish compatilate with the resin system used.

4.3 Epoxy Resins

Any epoxy resin system may be used which enables the property requirements to be met.

4.4 Preferred Compositions and Tolerances

The compositions of the materials shall lie within the overall limits given in Table 1.

5 REQUIREMENTS, AS RECEIVED

5.1 Width

NOTE — Preferred widths of tape are 10, 12, 15, 20, 25, 30, 40 and 50 mm. The maximum trimmed width of fullwidth material and sheet normally available is 1 000 mm.

The width of the material shall not differ from the nominal by more than +1·0 mm.

5.2 Thickness

The thickness established on 10 layers when measured in accordance with **3** of IS 9299 (Part 2) : 1992 using the apparatus given in **3.1** shall be within the appropriate limits given in Table 1.

5.3 Length

The length of a material in a roll shall not be less than that specified in the contract.

NOTE — Preferred lengths are 25, 50, 100 and 150 m.

Table 1 Composition

(*Clauses* 4.4 and 5.2)

Mica Content		Glass Content		Resin Content[1]		Mass per Unit Area		Thickness, mm	Max, Volatile Content Percent
g/M^2 (1)	Toler-ance (2)	g/M^2 (3)	Toler-ance (4)	g/M^2 (5)	Toler-ance (6)	g/M^2 (7)	Toler-ance (8)	(9)	(10)
63	±0%	22	±0%	63	±12·5%	145	±10%	0·09-0·10	1·0
73 60	±0%	34	±0%	71	±12·5%	105 190	±10%	0·12-0·15	1·0
90	±0%	34	±0%	81	±12·5%	210	±10%	0·15-0·10	1·0
120	±0%	34	±0%	105	±12·5%	260	±10%	0·10-0·22	1·0
150 160	±0%	34	±0%	120 130	±12·5%	303 320	±10%	0·20-0·26	1·0
100	±0%	34	±0%	150	±12·5%	363	±10%	0·22-0·26	1·0
240 250	±0%	34	±0%	160 190	±12·5%	450 465	±10%	0·26-0·30	1·0
370	±0%	34	±0%	220	±12·5%	560	±10%	0·35	1·0

[1] Related to the total mass per unit area the resin content in percent is approximately 40 percent.

5.4 Centres

Tape shall be compactly wound on centres of 25 mm, 55 mm or 75 mm ID which shall be free from sharp edges. The tolerance on the width of the centres shall be 0, – 1·0 mm of the width of the tape.

Full width and material wider than 100 mm shall be supplied on 55 mm or 75 mm centres.

5.5 Joints

Material should be preferably joint free. One joint per roll shall be permitted and the number of such rolls limited to 25 percent of any one consignment. Jointed rolls shall be packed together and clearly labelled on the outside of the container.

NOTE — The method of making the joint should be as agreed between the parties.

5.6 Tensile Strength

The tensile strength in the warp direction shall not be less than 140 N/10 mm with for 33 - 36 g/m^2 glass fabric and 80 N/10 mm with for 21 - 24 g/m^2 fabric. The weft shall be not less than 30 N/10 mm and 20 N/10 mm width respectively, when tested in accordance with **8** of IS 9299 (Part 2) : 1979.

5.7 Stiffness

Under consideration.

5.8 Resin Flow

Under consideration.

5.9 Gel Time

Under consideration.

5.10 Composition

The composition as detailed in Table 1, shall be determined in accordance with **4** of IS 9299 (Part 2) : 1992.

6 REQUIREMENTS — AFTER CURING

6.1 General

When required by a contract the suppliers shall provide evidence that this product type meets the following requirements:

For the following tests the specimens shall be prepared in accordance with IS 9299 (Part 2) : 1992 the number of layers being chosen to give a reduction in thickness of 25-30 percent per layer as determined by **5.2**. The test pieces shall be pressed for 1 hour at 100°C followed by a post cure of 16 hours at 140°C.

6.2 Density

The cured specimens shall exhibit densities between 1·8 and 2·2 g/m^3 when tested in accordance with IS 9299 (Part 2) : 1992.

6.3 Flexural Strength

The cured specimens shall have a flexural strength of not less than 180 N/mm^2 at 23°C and 120 N/mm^2 at 155°C when tested in accordance with **15** of IS 9299 (Part 2) : 1992.

6.4 Elastic Modulus

The cured specimens shall have an elastic modulus of not less than 40 kN/mm^2 *Min* when tested in accordance with **9** of IS 9299 (Part 2) : 1992.

6.5 Electric Strength

The cured specimens shall have an electric strength of not less than 30 kV/mm *Min* when tested in accordance with **9** of IS 9299 (Part 2) : 1992.

6.6 Dissipation Factor/Temperature Characteristic at 48-62 Hz

When tested in accordance with **16** of IS 9299 (Part 2) : 1992 the cured specimens shall exhibit the dissipation factor/temperature characteristics shown in Table **2**.

Table 2 Dissipation Factor/Temperature Characteristics

(*Clause* 6.6)

Temperature, °C	Dissipation Factor, *Max*
30	0·02
130	0·07
155	0·20

6.7 Thermal Endurance

This shall be carried out in accordance with **17** of IS 9299 (Part 2) : 1992 using flexural strength as the property with reduction to 50 percent of the original value as the end point criterion.

This product type shall have a temperature index of not less than 155.

7 MARKING

7.1 The material should be packed to ensure adequate protection during transport, handling and storage.

7.2 Interleaving

Plain polythene film of a suitable grade shall be used as an interleaving between the adjacent layers of the tape primarily to prevent adherence of one layer to the other, wherever necessary.

7.3 Joints

The tape shall be supplied in continuous length. However, one joint in a roll is permitted. The place of joint in the roll shall be indicated with the help of coloured strip. The number of rolls in a lot having joint acceptable shall be a matter of agreement between the supplier and the purchaser.

7.4 Rolls of tapes tightly wound on rigid plastics with rounded edges shall be packed in polystyrene box. In the box the rolls shall be supported in such a way that they do not touch any surface of the polystyrene box. The entire bunch of rolls inside the polystyrene box shall be put inside a bag of polythene film suitably sealed to prevent ingress of moisture.

8 MARKING

8.1 Each unit pack and each package containing a number of unit packs shall have the following information clearly and indelibly marked on it:

a) Description of the material and the number of this specification:

b) Grade of material;

c) For material delivered in rolls : the width of the material and length;

d) For material delivered as sheets : the length and width of the sheet and the number of sheets in a stack;

e) The number of rolls;

f) Indication of source of manufacture,

g) Date of manufacture;

h) Shelf life and storage conditions; and

j) The manufacturer's reference number and batch number;

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TO
IS 9299 (Part 3/Sec 6) : 1993 INSULATING MATERIALS BASED ON BUILT - UP MICA OR TREATED MICA PAPER — SPECIFICATION

PART 3 SPECIFICATION FOR INDIVIDUAL MATERIALS

Section 6 Glass Backed Mica Paper with B - Stage Epoxy Resin Bond

(*Page* 2, *Table*) — Composition:

(*Col* 1, *line* 3) — Substitute '80' *for* '60'.

(*Line* 8) — Substitute '180' *for* '100'.

(*Col* 2, *line* 3) — Substitute '±8%' *for* '± 0%' throughout.

(*Col* 4) — Substitute '± 8%' *for* '± 0%' throughout.

(*Col* 7, *line* 2) — Substitute '185' *for* '105'.

(*Line* 6) — Substitute '305' *for* '303'.

(*Line* 8) — Substitute '365' *for* '363'.

(*Col* 9, *line* 3) — Substitute '0.15 - 0.18' *for* '0.15 - 0.10'.

(*Line* 4) — Substitute '0.18 - 0.22' *for* '0.10 - 0.22'.

(*Line* 5) — Substitute '0.20 - 0.24' *for* '0.20 - 0.26'.

(*Clause* **5.6**, *line* 4) — Insert the word 'glass' after 'g/m^2'.

(ETD 02)

Reprography Unit, BIS, New Delhi, India